

Systematic Study on the Ophiuroidea from Cheju Island, Korea

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濟州島産 蛇尾類의 分類學的 研究

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摘 要

濟州島産 蛇尾類의 分類學的 研究를 하기 위하여 1965年 7月부터 1987年 7月까지 濟州島의 6個 地域(濟州港, 飛揚島, 西歸浦, 新天, 城山浦, 牛島)에서 採集하여 保管중이던 標本을 同定 · 分類하였다. 그 結果 2目 9科 19種의 蛇尾類가 濟州島에 分布하고 있는 것으로 밝혀졌고 이들 중 *Gorgonocephalus dolichodactylus* Döderlein, 1911, *Astrocladus ludwigi*(Döderlein, 1896), *Astroboa arctos* Matsumoto, 1915 및 *Amphipholis pugetana* Lyman, 1861 4種은 韓國未記錄種이다.

Key words: Systematics, Ophiuroidea, Cheju I., Korea

INTRODUCTION

The present study is a continuous work for the ophiuroid fauna in Korea. With regard to Ophiuroidea distributed in Cheju I. Rho and Kim (1966) reported one phrynophiurid and three myophiurid species, Rho (1979) reported nine myophiurid species, Rho and Shin (1983) recorded one phrynophiurid species and Shin and Rho (1986) reported one species belonging to Myophiurida. So far only eleven species

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were recorded from Cheju I.

Still further researches are needed for the survey of ophiuroidea fauna, particularly on the ophiuroids distributed in Cheju I. Cheju I. is noticeably abundant in ophiuroidea species of its own, namely, four of eleven recorded species have occurred only in Cheju I. Thus we performed the systematic and distributional study of ophiuroids collected from Cheju I. in detail.

MATERIALS AND METHODS

The materials used were collected from six localities (Cheju-hang, Piyangdo, Sŏgwip'o, Sinchŏn, Sŏgnsanp'o, and Udo) in Cheju I. during the period from July, 1963 to July, 1987. The specimens were collected by authors using pincette and shovel in the intertidal zone and obtained from the materials caught by fishingnet, fishing reel and SCUBA in the subtidal zone. They were fixed and preserved in about 75% methyl alcohol. We identified these specimens on the basis of their morphological characteristics. The species collected from this area and reported previously (Rho, 1979, Shin and Rho, 1986) are also included in this list of species. For those species newly reported in the present work, a brief description and the plates are introduced.

RESULTS

The ophiuroids identified turned out to be 19 species belonging to 9 families and 2 orders. Of which four species (asterisk*) are newly reported in Korean ophiuroid fauna.

The ten species previously recorded from Cheju I. (**) and the ten species reported from only Cheju I. (***) are presented in the systematic list.

Systematic list

- Order Phrynophiurida Matsumoto, 1915 혁사미 목
 Family Gorgonocephalidae Ljungman, 1867 삼천발이 과
 Genus *Gorgonocephalus* Lyman, 1865 삼천발이 속
1. ****Gorgonocephalus dolichodactylus* Döderlein, 1911 긴자루삼천발이 (신칭)
 Genus *Astrocladus* Verrill, 1899 가지거미불가사리 속
 2. *Astrocladus coniferus coniferus* Döderlein, 1902 흑가지거미불가사리
 3. *Astrocladus coniferus dofleini* Döderlein, 1910 도플라인흑가지거미불가사리
 4. ****Astrocladus ludwigi* (Döderlein, 1896) 부드웁가지거미불가사리 (신칭)
 Genus *Astroboa* Döderlein, 1911 별뿔거미불가사리 속
 5. ****Astroboa arctos* Matsumoto, 1915 굽거미불가사리 (신칭)
 Family Euryalidae Gray, 1840 넓적다리불가사리 과
 Genus *Astroceras* Lyman, 1879 별거미불가사리 속
 6. ****Astroceras annulatum* Mortensen, 1933 고리별거미불가사리
 Order Myophiurida Matsumoto, 1915 폐사미 목
 Suborder Laemophiurina Matsumoto, 1915 후사미 아목
 Family Ophiacanthidae (Perrier, 1879) 침거미불가사리 과

- Genus *Ophiacantha* Müller et Troschel, 1842 침거미불가사리 속
7. ****Ophiacantha linea* Shin and Rho, 1986 선침거미불가사리
Suborder Gnathophiurina Matsumoto, 1915 악사미 아목
Family Ophiactidae Matsumoto, 1915 뱀이거미불가사리 과
Genus *Ophiactis* Lütken, 1856 뱀이거미불가사리 속
 8. ****Ophiactis savignyi* (Müller et Troschel, 1842) 뱀이거미불가사리
Family Amphiuridae Ljungman, 1867 양편거미불가사리 과
Genus *Amphipholis* Ljungman, 1866 양비늘거미불가사리 속
 9. *Amphipholis squamata* (Delle Chiaje, 1829) 세이빨거미불가사리
 10. ****Amphipholis pugetana* Lyman, 1861 푸개타나양비늘거미불가사리 (신칭)
Genus *Amphiura* Forbes, 1842 턱뱀거미불가사리 속
 11. *Amphiura koreae* Duncan, 1879 턱뱀거미불가사리
Family Ophiotrichidae Ljungman, 1867 가시거미불가사리 과
Genus *Ophiothrix* Müller et Troschel, 1840 가시거미불가사리 속
 12. ** *Ophiothrix koreana* Duncan, 1879 고려가시거미불가사리
 13. ** *Ophiogymma fulgens* Koehler, 1905 큰뱀가시거미불가사리
 14. ****Ophiothela danae* Verrill, 1869 비단가시거미불가사리
Suborder Chilophiurina Matsumoto, 1915 순사미 목
Family Ophiidermatidae Ljungman, 1867 가죽거미불가사리 과
Genus *Pectinura* Forbes, 1843 빗거미불가사리 속
 15. ****Pectinura anchista* H.L. Clark, 1843 가죽빗거미불가사리
Genus *Ophiarachnella* Ljungman, 1872 뱀거미불가사리 속
 16. ** *Ophiarachnella gorgonia* (Müller et Troschel, 1842) 뱀거미불가사리
Family Ophiuridae Lyman, 1865 빗살거미불가사리 과
Subfamily Ophiopodinae Matsumoto, 1915 비늘거미불가사리 아과
Genus *Ophioplocus* Lyman, 1861 굽술거미불가사리 속
 17. ** *Ophioplocus japonicus* H.L. Clark, 1911 왜굽술거미불가사리
Subfamily Ophiurinae Lyman, 1865 빗살거미불가사리 아과
Genus *Ophiura* Lamarck, 1801 빗살거미불가사리 속
 18. ** *Ophiura sarsii* Lütken, 1854 살시빗살거미불가사리
Family Ophiocomidae Ljungman, 1867 뱀털거미불가사리 과
Genus *Ophiomastix* Müller et Troschel, 1842 채찍거미불가사리 속
 19. ****Ophiomastix mixta* Lütken, 1869 빨간등거미불가사리

Description of Species

1. ****Gorgonocephalus dolichodactylus* Döderlein, 1911 긴자루삼천발이 (pl. 1, figs. 1-5)
Gorgonocephalus dolichodactylus Döderlein, 1911 (p. 34, fig. 6a-d, pl. 1. fig. 4,5, pl. 4. fig 6, pl. 7. fig. 3, 4b).
Gorgonocephalus dolichodactylus: matsumoto, 1912c (p. 387); 1971 (p. 73); A.M. Clark, 1939 (p. 13); Baker, 1980 (p. 52, fig. 180, 20, 30).

Material examined: One specimen, Dec. 5. 1978, Cheju-hang, B. J. Rho.

Description: Disc diameter is 18 mm. Disc is covered with many small granules. Radial shields

are narrow, long, tapering toward disc center and densely covered with distinct, large granules. Ventral interbranchial area is covered with smaller granules than the disc but usually present in varying sizes around the oral shield area. Genital slits are bordered by a double rows of large tubercles of which the inner one is longer than the outer one. Madreporite is one in number. Teeth and oral papillae are spiniform. Arm spines are two or three, cylindrical shape, shorter than an arm joint and distally becoming hooks of two pointed tips. Dorsal arm surface between girdle bands is covered with transversely elongated plates scattered granules. Ventral arm surface is also covered with granules. Color (dried from alcohol) is light brown.

Distribution: Korea (Cheju I.), Japan (Sagami Bay), Philippines, Australia, New Zealand.

2. *Astrocladus coniferus coniferus* (Döderlein, 1902) 혹가지거미불가사리

Astrocladus coniferus: Döderlein, 1911 (p. 46, 75, pl. II, figs. 7.7a, pl. VI, figs. 5-6a, 16); Matsumoto, 1912c (p. 388); H.L. Clark, 1915 (p. 186); Matsumoto, 1917 (p. 77, fig. 23); Döderlein, 1927 (p. 94); Murakami, 1944a (p. 247); 1944b (p. 262); D'yakonov, 1954 (p. 20); Murakami, 1963b (p. 7, pl. 1, fig. 8, pl. 3, 33, 34); Irimura, 1968 (p. 32); 1969 (p. 39); 1981 (p. 18); 1982 (p. 9, Text-fig. 5, pl. 1, fig. 3, pl. IV, figs. 1-3).

Astrophyton cornutum: H.L. Clark, 1911 (p. 293).

Astrophyton coniferum: H.L. Clark, 1915 (p. 186).

Gorgonocephalus caryi: Rho & Kim, 1966 (p. 290, pl. IX, fig. 49-50).

Material examined: One specimen, Dec. 7, 1971, Sögwip'o, B.J. Rho.

Distribution: Korea (Sea of Japan, Korea Strait, Cheju I.), Japan (Southern Honsyu, Kyusyu), Peter the Great Bay, East China Sea, Philippines, Indo-Pacific Ocean.

3. *Astrocladus coniferus dofleini* Döderlein, 1910 도플라인-혹가지거미불가사리

Astrocladus dofleini: Döderlein, 1911 (p. 41, fig. 9, pl. II, figs. 15-15b); 1927 (p. 94, p. 35).

Astrocladus coniferus dofleini: Matsumoto, 1912c (p. 388).

Astrocladus coniferus var. *dofleini*: Matsumoto, 1917 (p. 77); Irimura, 1968 (p. 32); 1979 (p. 2); 1981 (p. 19); 1982 (p. 11, Text-fig. 6, pl. IV, fig. 5, 6).

Material examined: Two specimens, Dec. 15, 1969, Sögwip'o, B.J. Rho; one specimen, Aug. 9, 1970, Söngsanp'o, B.J. Rho; five specimens, Feb. 7, 1971, Sögwip'o, B.J. Rho; one specimen, Dec. 24, 1971, Sögwip'o, B.J. Rho; one specimen, Oct. 20, 1973, Sögwip'o, B.J. Rho; one specimen, Feb. 6, 1986, Cheju-hang (80 m in depth), S. Shin.

Distribution: Korea (Korea Strait, Cheju I.), Japan (Southern Honsyu, Kyusyu), Peter the Great Bay, Philippines.

4. **Astrocladus ludwigi*** (Döderlein, 1896) 루트윅-혹가지거미불가사리 (pl. 1, figs. 6-9)

Euryale ludwigi Döderlein, 1896 (p. 299, pl. 18, fig. 28 a-c).

Astrocladus ludwigi: Döderlein, 1911 (p. 106, fig. 8); H.L. Clark, 1915 (p. 187); Döderlein, 1927 (P. 33, pl. 3, fig. 3a-b, p. 93); Baker, 1980 (p. 63, figs. 28, 33).

Material examined: One specimen, Feb. 7, 1971, Sögwip'o, B.J. Rho.

Description: Disc diameter is 35 mm. Disc is covered with many round granules and tubercles, but at the disc center and on or between radial shields large tubercles are scattered and the interbranchial area is covered with small granules. Ventral surface of disk is covered with flat plates similar to those of arms but near the mouth they are small and slightly swollen. Genital slits are very small, D-shaped and bordered by pointed tubercles. Madreporite is one in number and situated at the ventral side of disc away from the border of interbranchial area. Oral papillae are small and spiniform. Arms are distinctly annulated with girdle bands of hook-bearing granules from the first fork. Dorsal

arm surface is paved with somewhat convex plates but ventral one is paved with flat plates. Arm spines appear from the first arm branch and consist of stumps with pointed tip. Color (dried from alcohol) is dark gray and variegated with dark ones on the disc except radial shields and the ventral interbranchial area.

Distribution: Korea (Cheju I.), Indonesia, North-western Australia.

5. ****Astroboa arctos* Matsumoto, 1915. 곰거미불가사리 (pl. 1, figs. 10-14)

Astroboa arctos Matsumoto, 1915a(p. 57).

Astroboa arctos: H.L. Clark, 1915 (p. 187); Matsumoto, 1917 (p. 80, fig. 24); Döderlein, 1927 (p. 95); Murakami, 1944b (p. 262); 1963b (p. 7, pl. 1, fig. 10); Irimura, 1968 (p. 33); 1969 (p. 40); 1981 (p. 20); 1982 (p. 14, text-fig. 8, pl. III, fig. 6).

Material examined: One specimen, Dec. 24, 1971, Sögwip'o, B.J. Rho.

Description: Disc diameter is 60 mm. Disc is covered with minute and smooth granules. Radial shields are narrow, widest distally and they are scattered with coarser granules than one of the other parts of disk, with a large, slightly concave plate. The branches of arm are not equal and four arm segments are usually located between the first and the second branch of arm. The dorsal surface of arm is uniformly scattered with tubercles like granules and the double rows of hook-bearing granules are present in very fine twigs. Genital slits are closely bordered with small spines. Madreporite is somewhat semilunar shape and situated at the inner corner of the ventral interbranchial area. Teeth and oral papillae are numerous. Teeth are larger and longer than papillae and spatulate shape with flattened tip while oral papillae are small and spiniform. Arm spines are appeared from the fourth branch, thereafter very small ones with one to three points looks like granules and two or four in number initially. Only the first central pores are distinct. Color (dried from alcohol) is gray at dorsal side and brown at ventral side.

6. ****Astroceras annulatum* Mortensen, 1933 고리별거미불가사리

Astroceras annulatum Mortensen, 1933a (p. 47, fig. 32, pl. 5, fig. 20-25).

Astroceras pergamena (part): Matsumoto, 1911 (p. 622); 1912c (p. 380); 1917 (p. 35, fig. 7b).

Astroceras annulatum: Murakami, 1944b (p. 261); 1963b (p. 7, pl. 3, fig. 23, 24); Irimura, 1969 (p. 39); 1981 (p. 17); 1982 (p. 18, Text-fig. 11, pl. V, fig. 4-6).

Astroceras calix: Rho & Kim, 1966 (p. 289, Text-fig. 5, pl. VIII, fig. 47-48).

Material examined: Two specimens, Aug. 6, 1970, Sögwip'o, B.J. Rho; three specimens, Dec. 26, 1971, Sögwip'o, B.J. Rho; one specimen, Dec. 26, 1976, Sögwip'o, B.J. Rho; eleven specimens, Oct. 9, 1986. Sinchön, S. Shin.

Remark: This species inhabits attaching to Gorgonaceans and Alcyonaceans of Anthozoa and undergoes self-fission and regeneration.

Distribution: Korea (Cheju I.), Japan (Southern Honsyu, Kyusyu), Timor.

7. ****Ophiacantha linea* Shin and Rho, 1986 선침거미불가사리

Ophiacantha linea Rho and Shin, 1986 (pp. 60-66, pl. 1, figs. 1-6; pl. 2, figs. 1-6).

Material examined: one specimen, Oct. 9, 1986, Sögwip'o, S. Shin.

Distribution: Korea (Cheju I.).

8. ****Ophiactis savignyi* (Müller and Troshel, 1842) 뱀이거미불가사리

Ophiolepis savignyi Müller et Troschel, 1842 (p. 95).

Ophiactis sex-radial: Lyman, 1865 (p. 115); 1874 (p. 253); Koehler, 1898 (p. 72).

Ophiactis savignyi: Martens, 1870 (p. 249); Marktanner-Turneretscher, 1887 (p. 296); Brock, 1888 (p. 482); Lütken

& Mortensen, 1899 (p. 140); Koehler, 1905 (p. 26); Mortensen, 1936 (p. 264).

Ophiactis krebsii: Duncan, 1879 (p. 465).

Ophiactis savignyi: Lyman, 1882 (p. 115); H.L. Clark, 1915 (p. 265); Matsumoto, 1917 (p. 158, fig. 39); H.L. Clark, 1921 (p. 108); Koehler, 1922 (p. 193, p. 164, fig. 5, 6, pl. 96, fig. 2); Mortensen, 1933c (p. 442); Engel, 1938 (p. 21); H.L. Clark, 1939 (p. 77); A.M. Clark, 1939 (p. 3); Mortensen, 1940 (p. 70); Murakami, 1942 (p. 8); Ely, 1942 (p. 42, pl. 10, fig. 10); Murakami, 1943a (p. 167); 1944b (p. 264); H.L. Clark, 1946 (p. 210); A.M. Clark, 1949 (p. 31); Murakami, 1963a (p. 174); Parslow & A.M. Clark, 1963 (p. 44); Murakami, 1963b (p. 14, pl. 1, fig. 34, pl. 4, fig. 41-42); A.M. Clark & Davies, 1966 (p. 499); Domantay & Domantay, 1966 (p. 23, p. 9); A.M. Clark, 1967a (p. 47); Irimura, 1968 (p. 33); James & Pearse, 1969 (p. 90); Irimura, 1969 (p. 40); Knudsen & Wolff, 1970 (p. 207); Madsen, 1970 (p. 207, fig. 33); A.M. Clark & Rowe, 1971 (p. 103, fig. 31b); A.M. Clark & Taylor, 1971 (p. 9); Devaney, 1974 (p. 107, p. 134); Gibbs *et al.*, 1976 (p. 123); A.M. Clark & Courtman-Stock, 1976 (p. 164, figs. 156-216); Liao, 1978 (p. 72, fig. 2); Pawson, 1978 (p. 11); Cherbonnier & Guille, 1978 (p. 125, fig. 57); Rho, 1979 (p. 46, pl. 8, figs. 3-6); A.M. Clark, 1980a (p. 487); 1980b (p. 548); Irimura, 1981 (p. 21); 1982 (p. 28).

Material examined: Ten specimens, Feb. 15, 1976, Sögwip'o, B.J. Rho; three specimens, Jul. 13, 1979, Sögnsanp'o, S. Shin; four specimens, Jul. 17, 1981, Cheju-hang, C.J. Shim; nine specimens, Oct. 9, 1981, Sögwip'o (50 m in depth), S. Shin.

Remark: This species undergoes self-fission and regeneration.

Distribution: Korea (Cheju I.), Japan (Honsyu, Kyusyu), China; Philippines, Singapore, Northern Australia, Zanzibar, Indo-west Pacific ocean.

9. *Amphipholis squamata* (Delle Chiaje, 1828) 세이빨거미불가사리 (pl. 2, figs. 1-5)

Asterias squamata Delle Chiaje, 1828 (vol. 3, p. 74).

Ophislepis squamata: Müller et Troschel, 1842 (p. 92).

Amphiura squamata: Lyman, 1879 (p. 32); 1882 (p. 136); Mortensen, 1920 (p. 3).

Amphipholis squamata: Lyman, 1882 (p. 136, p. 296); Verrill, 1899 (p. 312); Koehler, 1914 (p. 66); H.L. Clark, 1915 (p. 42); Mortensen, 1920 (p. 2); H.L. Clark, 1921 (p. 106); Mortensen, 1924 (p. 161, p. 453); 1927 (p. 221); 1933b (p. 63); 1936 (p. 292); Ely, 1942 (p. 36); Murakami, 1943a (p. 172); Fell, 1946 (p. 426); H.L. Clark, 1946 (p. 202); (p. 29); A.M. Clark, 1952 (p. 200); Mortensen, 1952 (p. 20); D'yakonov, 1954 (p. 57); Parslow & A.M. Clark, 1963 (p. 44); Bernasconi, 1965 (p. 146); A.M. Clark, 1966 (p. 291); 1967a (p. 47); Knudsen & Wolff, 1970 (p. 202, fig. 30); A.M. Clark, 1970 (p. 30); A.M. Clark & Rowe, 1971 (p. 80, 99); Devaney, 1974 (p. 125); A.M. Clark, 1976 (p. 258); Gibbs *et al.*, 1976 (p. 119); A.M. Clark & Courtman-stock, 1976 (p. 151); Bernasconi & D'Agostino, 1977 (p. 89); Liao, 1978 (p. 71, fig. 1); Cherbonnier & Guille, 1978 (p. 105, fig. 48); A.M. Clark, 1980b (p. 547); Irimura, 1982 (p. 41, Text-fig. 26, pl. II, fig. 7); Yi, 1983 (p. 14, pl. 1, figs. 11-12).

Amphipholis japonica: Matsumoto, 1915a (p. 71); H.L. Clark, 1915 (p. 241); Matsumoto, 1917 (p. 186, fig. 49); Murakami, 1942 (p. 10); 1944b (p. 265); Fell, 1962 (p. 13); Murakami, 1963a (p. 175); 1963b (p. 19, pl. 1, fig. 46, pl. 5, figs. 13, 14); Irimura, 1968 (p. 33); 1969 (p. 41); 1979 (p. 3); 1981 (p. 25).

Axiognathus squamata: Kyte, 1969 (p. 1733); A.M. Clark, 1970 (p. 29).

Material examined: One specimen, Jul. 11, 1979, Sögnsanp'o, S. Shin.

Distribution: Korea (Korea Strait, Cheju I.), Japan, Boreal Sea, Indo-west Pacific Ocean, Atlantic Ocean,

10. * *Amphipholis pugetana*** (Lyman, 1868) 푸개타나양비늘거미불가사리(신칭) (pl. 2, figs. 6-11)

Amphiura pugetana Lyman, 1868 (p. 193).

Amphiura pugetana: Lyman, 1865 (p. 125); 1882 (p. 145); May, 1924 (p. 289).

Amphipholis pugetana: Verrill, 1899 (p. 312); McClendon, 1909 (p. 43, figs. 12, 13); H.L. Clark, 1911 (p. 166).

fig. 73); 1915 (p. 242); Matsumoto, 1917 (p. 191, fig. 51; p. 478); May 1924 (p. 289); Matsumoto, 1941 (p. 338); D'yakonov, 1954 (p. 58); Fell, 1962 (p. 13).

Axiopnathus pugetana: Kyte, 1969 (p. 1729).

Material examined: Two specimens, Jul. 12, 1979, Söngsanp'o, B.J. Rho; one specimen, Jul. 12, 1979, Söngsanp'o, B.J. Rho; one specimen, Jul. 13, 1979, Udo, S. Shin.

Description: Disc diameter is 3.8-4.0 mm. Disc is covered with very fine, numerous scales and the primary plates are indistinguishable from others. Arm spines are slender, three in number but four at the proximal part of arm. The length of arm spines is shorter than the length of arm joints. Arms are long and very slender. The length of arm is more than eight times as long as the disc diameter. Radial shields are narrow, completely jointed in pairs and its length is about twice as long as its width. Interbrachial area is also covered with scales which are smaller than these of disc. Dorsal arm plate is triangular shape with rounded outer margin, nearly as long as the corresponding arm joint and its width is two and a half times as long as its length. Dorsal and ventral arm plates are not in direct contact with each other. Oral shields are small, rhomboidal shape with very pointed inner side and its length is longer than its width. Adoral plates are triangular shape and widely contact with each other in oral side. Three oral papillae are present and the outer one is longest, widest among the others and nearly as long as lateral oral plates. Two tentacle scales present in a tentacle pore and the adradial one is round, much larger than the radial one. Color (dried from alcohol) is dark brown.

Remark: Unlike Lyman's description (1868) the adradial tentacle scale is very large and its length is longer than the outer margin of ventral arm plates.

Distribution: Korea (Cheju, I.), Japan (Aomori Bay, Hokkaido), Alaska, Puget Sound, Washington, California.

11. *Amphiura koreae* Duncan, 1879 턱뱀거미불가사리

Amphiura coreae: Duncan, 1879 (p. 466, pl. X, figs. 18 & 19).

Amphiura coreae: Lyman, 1882 (p. 146).

Amphiura koreae: Koehler, 1898 (p. 119); Matsumoto, 1917 (pp. 198-199, fig. 53); D'yakonov, 1954 (p. 62); Fell, 1962 (p. 11); A.M. Clark, 1965 (p. 47); 1970 (p. 41); Rho, 1979 (pl. 5, figs. 3-4).

Amphipholis corea: Verrill, 1899 (p. 312).

Material examined: One specimen, Dec. 5, 1979, Cheju-hang, C.J. Shim

Remark: The specimens were found to inhabit in crowd within the dead corals.

Distribution: Korea (Korea Strait, Cheju I.) Japan, China. Philippines, Indo-West Pacific Ocean, Madagascar, California, Central America.

12. *Ophiothrix koreana* Duncan, 1879 고려가시거미불가사리

Ophiothrix koreana Duncan, 1879 (p. 473, pl. XI, figs. 28-32).

Ophiothrix koreana: Lyman, 1882 (p. 266); Marktanner-Turneretscher, 1887 (p. 303); Brock, 1888 (p. 537); Koehler, 1899 (p. 121); H.L. Clark, 1911 (p. 257-262, figs. 127-128); 1915 (p. 273); Matsumoto, 1917 (p. 220); Koehler, 1922 (p. 242, pl. 45, figs. 1-6, pl. 99, fig. 4); Murakami, 1942 (p. 20); 1943c, p. 132-233; 1944b (p. 267); D'yakonov, 1954 (p. 78); Murakami, 1963a (p. 176); 1963b (p. 22, pl. 2, fig. 9, pl. 5, figs. 35, 36); A.M. Clark, 1965 (p. 61, pl. I, figs. 3, 4); Rho & Kim, 1966 (p. 285, Text-fig. 1, pl. 7, figs. 39-40); Irimura, 1968 (p. 33); 1969, p. 43; 1979 (p. 3); Rho, 1979 (p. 43, pl. 6, figs. 3-8, pl. 7, fig. 1); Irimura, 1981 (p. 29).

Ophiothrix eusteria: H.L. Clark, 1911 (p. 265, fig. 132); Matsumoto, 1917 (p. 219); A.M. Clark, 1965 (p. 62).

Ophiothrix paucyendyta: H.L. Clark, 1911 (p. 264); A.M. Clark, 1965 (p. 62); 1967b (p. 647); Irimura (1982, p. 47).

Material examined: One specimen, Dec. 24, 1971, Sögwip'o B.J. Rho; one specimen, Dec. 15, 1973, Söngsanp'o, B.J. Rho.

Remark: The region of tooth plate pore correspond to one third of total length unlike Murakami's description (1963b).

Distribution: Korea (Korea Strait, Cheju I.), Japan, East China Sea, Philippine, Amboina, Banda Sea.

13. *Ophiogymna fulgens* (Koehler, 1905) 큰뿔가시거미불가사리**

Ophiothrix fulgens Koehler, 1905 (p. 107, pl. X, figs. 3-6).

Ophiothrix macrobrochia: H.L. Clark, 1911 (p. 267, fig. 133); 1915 (p. 275); A.M. Clark, 1967b (p. 649).

Ophiogymna fulgens: Koehler, 1922 (p. 288, pl. 42, figs. 1-8, pl. 43, figs. 9, 10, pl. 44, fig. 8, pl. 50, fig. 6, pl. 103, fig. 8); Irimura, 1981 (p. 34, figs. 5, 6, 7); 1982 (p. 62).

Placophiothrix phlixa: H.L. Clark, 1939 (p. 88, figs. 39, 40).

Material examined: One specimen, Feb. 15, 1976, Sögwip'o, B.J. Rho.

Distribution: Korea (Korea Strait, Cheju I.), Japan, China, East China Sea, Philippines, Indonesia.

14. **Ophiothela danae* Verrill, 1869 비단가시거미불가사리**

Ophiothela danae Verrill, 1869, p. 391.

Ophiothela danae: Lyman, 1865 (p. 8); 1882 (p. 230); Brock, 1888 (p. 89); 1905 (p. 117); H.L. Clark, 1915 (p. 284); Matsumoto, 1917 (p. 230, fig. 67); H.L. Clark, 1921 (p. 117); Koehler, 1922 (p. 297, pl. 59, figs. 1, 2, 3, pl. 103, fig. 1); Mortensen, 1940 (p. 68); Murakami, 1942 (p. 20); 1943a (p. 180); 1944b (p. 269); 1963b (p. 22; pl. 2, fig. 15, pl. 5, figs. 51, 52); A.M. Clark, 1965 (p. 69); A.M. Clark & Davies, 1966 (p. 599); Irimura, 1968 (p. 34); Downey, 1969 (p. 185); Irimura, 1969 (p. 44); A.M. Clark and Rowe, 1971 (p. 84); A.M. Clark, 1974 (p. 470); Gibbs *et al.*, 1976 (p. 125); A.M. Clark & Courtman-Stock, 1976 (p. 141); Liao, 1978 (p. 85); Cherbonnier et Guille, 1978 (p. 158, pl. VII, figs. 3, 4); Rho, 1979 (p. 44, pl. 8, figs. 7, 8); A.M. Clark, 1980a (p. 33); 1982 (p. 52, Text-figs. 3, 4, pl. XI, figs. 1-6, pl. XII, figs. 1, 2).

Ophiothela verrill: Duncan, 1879 (p. 477, pl. II, fig. 33).

Ophiothela caerulea: H.L. Clark, 1915, p. 284, pl. XIV, fig. 1).

Ophiothela hadra: H.L. Clark, 1915, p. 284, pl. XIV, fig. 2; 1921 (p. 117).

Material examined: One specimen, Jul. 10, 1965, Sögwip'o, B.J. Rho; fifty three specimens, Dec. 14, 1969, Sögwip'o B.J. Rho; One specimen, Aug. 1, 1970, Sögwip'o, B.J. Rho; Seven specimens, Feb. 7, 1971, Sögwip'o, B.J. Rho; five specimens, oct. 9, 1986, Sinch'on (50 m in depth), S. Shin.

Remark: This species inhabit Gorgonaceans and Alcyonaceans of Anthozoa

Distribution: Korea (Cheju I.), Japan, East China Sea, Indo-west Pacific Ocean, Zanzibar, New Zealand.

15. **Pectinura anchista* H.L. Clark, 1911 가죽뿔거미불가사리**

Pectinura anchista H.L. Clark, 1911 (p. 23, fig. 1).

Pectinura anchista: Matsumoto, 1917 (p. 322); Murakami, 1942 (p. 33); A.M. Clark, 1965 (p. 64); Irimura, 1968, (p. 37); Downey, 1969 (p. 221); Irimura, 1979 (p. 5); Rho, 1979 (p. 36, pl. 1, figs. 1-4); Irimura, 1981 (p. 45); 1982 (p. 64; Text-fig. 38).

Material examined: One specimen, Jul. 13, 1979, Sögwip'o, S. Shin.

Remark: This specimen belongs to olygogranule type among two types of Clark's specimens (1911).

Distribution: Korea (Cheju I.), Japan, East China Sea, Indo-west Pacific Ocean, Zanzibar, New Zealand.

16. *Ophiarachnella gorgonia* Müller et Troschel, 1842** 뱀거미불가사리

Ophiarachnella gorgonia Müller et Troschel, 1842 (p. 105).

Ophiarachna gorgonia: Lyman, 1865 (p. 39).

Ophiarachna gorgonia: Lyman, 1865 (p. 39).

Pectinura gorgonia: Martens, 1870 (p. 245); Lyman, 1874 (p. 253); 1879 (p. 49); 1882 (p. 15); Brock, 1888 (p. 471); Koehler, 1898 (p. 59, pl. II, figs. 1, 2); 1905 (p. 8); H.L. Clark, 1908 (p. 289).

Pectinura marmorata: Lyman, 1874 (p. 222, pl. V, figs. 1-7); 1882 (p. 17).

Pectinura stearnsii: Ives, 1891 (p. 212, pl. XI, figs. 1-5).

Ophiarachnella gorgonia: H.L. Clark, 1909 (p. 123); 1911 (p. 25); 1915 (p. 305); Matsumoto, 1917 (p. 323); H.L. Clark, 1921 (p. 141); Koehler, 1922 (p. 339); Murakami, 1942 (p. 33); 1943a (p. 187); 1943b (p. 214); 1944b (p. 272); H.L. Clark, 1946 (p. 260); Murakami, 1963a (p. 180); 1963b (p. 37, pl. 2, fig. 54, pl. 7, figs. 7, 8); A.M. Clark, 1965 (p. 66); Domantay & Domantay, 1966 (p. 60); Rho & Kim, 1966 (p. 288, pl. 8, figs. 45, 56); Domantay & Conlu, 1968 (p. 166); Irimura, 1968 (p. 37); 1969 (p. 45, pl. 2, fig. 2); A.M. Clark & Rowe, 1971 (p. 88); Gibbs *et al.*, 1976 (p. 129); Cherbonnier & Guille, 1978 (p. 217, pl. XV, figs. 5, 6); Liao, 1978 (p. 93); Irimura, 1979 (p. 5); Sloan *et al.*, 1979 (p. 11); Rho, 1979 (p. 36); A.M. Clark, 1980a (p. 488); 1980b (p. 535); Irimura, 1981 (p. 43); 1982 (p. 66, Text-fig. 39, pl. XIII, fig. 6).

Material examined: One specimen, Jul. 11, 1979, Sögwip'o, S. Shin; one specimen, Jul. 12, 1979, Söngsanp'o, S. Shin; One specimen, Jul. 13, 1979, Udo, S. Shin; five specimens, Feb. 5, 1986, Piyangdo, S. Shin.

Distribution: Korea (Sea of Japan, Korea Strait, Cheju I.), Japan, Philippines, Indo-west Pacific Ocean, Zanzibar.

17. *Ophioplocus japonicus* H.L. Clark, 1911** 왜곰솔거미불가사리

Ophioplocus japonicus H.L. Clark, 1911 (p. 30, fig. 5).

Ophioplocus imbricatus: Lyman, 1874 [p. 228 (pars)]; Marktanner-Turneretscher, 1887 (p. 295); Ives, 1891 (p. 213, pl. V, figs. 6-10).

Ophioplocus japonicus: H.L. Clark, 1915 (p. 344); Matsumoto, 1917 (p. 302, fig. 84); Murakami, 1942 (p. 31); 1944b (p. 270); 1963b (p. 32, pl. 2, fig. 29, pl. 6, figs. 19, 20); A.M. Clark, 1965 (p. 66); Rho & Kim, 1966 (p. 286, Text-fig. 2, pl. 7, figs. 41, 42); Irimura, 1968 (p. 36); 1969 (p. 45); Downey, 1969 (p. 178); Irimura, 1979 (p. 4); Rho, 1979 (p. 37); A.M. Clark, 1980a (p. 488); Irimura, 1981 (p. 41); 1982 (p. 77).

Material examined: Five specimens, Aug. 2, 1970, Sögwip'o, B.J. Rho; one specimen, Jul. 14, 1973, Sögwip'o, B.J. Rho; two specimens, Jul. 11, 1979, Sögwip'o, S. Shin, twenty seven specimens, Jul. 12, 1979, Söngsanp'o, S. Shin; seven specimens, Feb. 5, 1986, Piyangdo, S. Shin.

Distribution: Korea (Sea of Japan, Korea Strait, Cheju I.), Japan (Honsyu, Kyusyu).

18. *Ophiura sarsii* Lütken, 1854** 살시뱀살거미불가사리

Ophiura sarsii Lütken, 1854 (p. 101).

Ophioglypha sarsii: Lyman, 1865 (p. 41, figs. 2-3); 1878 (p. 99); 1882 (p. 40); 1883 (p. 241); Koehler, 1914 (p. 23, pl. 1, figs. 5-6).

Ophiura sarsii: H.L. Clark, 1911 (p. 37); Koehler, 1914 (p. 23, pl. 1, figs. 5-6); H.L. Clark, 1915 (p. 323); Matsumoto, 1917 (p. 272, fig. 74); Matsumoto *et al.*, 1918 (p. 479); Koehler, 1922 (p. 386, p. 184, figs. 10, 11); Matsumoto, 1941 (p. 343, Text-fig. 10); Chang, 1948 (p. 65, pl. X, figs. 3, 4); Murakami, 1963b (p. 35, pl. 2, fig. 40, pl. 6, figs. 39, 40); Kyte, 1969 (p. 1731); Rho, 1979 (p. 38, pl. 2, figs. 3-6).

Ophiura sarsi: Mortensen, 1927 (p. 238, fig. 128, 1-2); 1933b (p. 72).

Ophiura sarsi: D'yakonov, 1954 (p. 78, fig. 35); A.M. Clark, 1965 (p. 68).

Ophiura sarsi var. *radicular*: D'yakonov, 1954 (p. 98, fig.36); A.M. Clark, 1965 (p. 68); Irimura, 1979 (p. 4).

Ophiolepis cardioplax: Rho & Kim, 1966 (p. 287, Text-fig. 3a, b, pl. VIII, figs. 43, 44).

Material examined: Four specimens, Feb. 6, 1971, Sögwip'o, B.J. Rho.

Distribution: Korea (Yellow Sea, Korea Strait, Sea of Japan, Cheju I.), Japan (Honshyu, Hakodate Bay), North Pacific Ocean, Arctic Ocean, North Atlantic Ocean, North Africa.

19. **Ophiomastix mixta*** Lütken, 1869 빨간등 기미불가사리

Ophiomastix mixta Lütken, 1869 (pp. 44, 99).

Ophiomastix mixta: Lyman, 1874 (p. 252); 1882 (pp. 175, 298); Brock, 1888 (pp. 497, 504, 536); Koehler, 1905 (pl. VI, fig. 15, pl. XV, fig. 1, p. 68); 1905 (p. 135); H.L. Clark, 1915 (p. 96); Matsumoto, 1917 (p. 348, fig. 97); H.L. Clark, 1921 (p. 135, pl. 14, fig. 2); Koehler, 1922 (p. 330); D'yakonov, 1930 (p. 246); Murakami, 1942 (p. 34), 1943a (p. 199), 1943b (p. 220), 1944b (p. 277); H.L. Clark, 1946 (p. 248); A.M. Clark, 1952 (p. 296); Murakami, 1963a (p. 180), 1963b (p. 27, pl. 7, figs. 25, 26); A.M. Clark, 1965 (p. 66); Irimura, 1968 (p. 37), 1969 (p. 45, pl. 2, fig. 10); A.M. Clark & Rowe, 1971 (p. 120, p. 86); Devaney, 1978 (p. 319, figs. 21, 22); Liao, 1978 (p. 91, fig. 16); A.M. Clark, 1980a (p. 488); Irimura, 1981 (p. 46); 1982 (p. 74).

Material examined: One specimen, Feb. 15, 1976, Sögwip'o, B.J. Rho; two specimens, Jul. 13, 1979, Sögwip'o, S. Shin.

Distribution: Korea (Cheju I.), Japan (Sagami Bay), Philippines, Amboina.

ABSTRACT

For the systematic study of Ophiuroidea from Cheju I., Korea the present work was undertaken using the materials collected from six localities of Cheju I. (Cheju-hang, Piyando, Sögwip'o, Sinchön, Söngsanp'o, Udo) during the period from July 1965 to July 1987.

The ophiuroids identified turned out to be 19 species, nine families and two orders. Of which four species are newly reported in Korean fauna and they are as follows: *Gorgonocephalus dolichodactylus* Döderlein, 1911, *Astrocladus ludwigi* (Döderlein, 1896), *Astroboa arctos* Matsumoto, 1915 and *Amphipholis pugetana* Lyman, 1861.

REFERENCES

- Baker, A. N., 1980. Euryalinid Ophiuroidea (Echinodermata) from Australia, New Zealand and the south-west Pacific Ocean. New J. Zool., 7: 11-83.
- Bernasconi, I., 1965. Ophiuroidea do Puertos Deseados (Santa Cruz Argentina). Physis, 25, 69: 143-152.
- Bernasconi, I. and M. M. D'Agostino, 1977. Ophiuroideos del o. mar Epicontinental Argentino. ibid., 5, 5: 64-114, 11 pls.
- Brock, J., 1888. Die Ophiuridenfauna des Indischen Archipels. Zeit. f. Wiss. Zool., 48, 3: 465-539.
- Chang, F. Y., 1948. Echinoderms of Tsingtao. Cont. Inst. Zool. Nat. Acad. Peiping, 4, 2: 33-104, 11 pls.
- Cherbonnier, G. and A. Guille, 1978. Faune de Madagascar 48, Echinodermes: Ophiurides. Editions du C.N.R.S., Paris, 253 pp. 77 figs., 17 pls.

- Clark, A. M., 1939. Echinoderms (Other than Holothruians Collected on the Presidential Cruise of 1938). Smith. Miscell. Coll., **98**, 11:1-18.
- Clark, A. M., 1949. Ophiuroidea of the Hawaiian Islands. Bernice P., Bishop Museum Bull., 195: 1-133.
- Clark, A. M., 1952. Echinoderms from the Marshall Islands, Proc. U.S. Nat. Mus. **102**, 3302: 265-303.
- Clark, A. M., 1965. Japanese and Other Ophiuroids from the Collections of the München Museum. Bull. Br. Mus. Nat. Hist. (Zool.), **13**, 2: 39-71, 1 pl.
- Clark, A. M., 1966. Prot Phillip Survey 1957-1963, Echinodermata. Mem. Nat. Mus. Vict., **27**: 289-350, 4 pls.
- Clark, A. M., 1967 a. Echinoderms from the Red Sea, Part 2 (Crinoids, Ophiuroids, Echinoids and More Asteroids). Israel South Red Sea Exp. 1962. Rep., **21**: 26-57.
- Clark, A. M., 1967b. Notes on the Family Ophiotrichidae (Ophiuroidea). Ann. & Mag. Nat. Hist. Ser., **13**, 9: 637-655.
- Clark, A. M., 1970. Notes on the family Amphiuridae (Ophiuroidea). Bull. Brit. Mus. (Nat. Hist.) Zool., **19**, 1: 1-81.
- Clark, A. M., 1974. Notes on Some Echinoderms from Southern Africa. *ibid.*, **26**, 6: 423-487, 3 pls.
- Clark, A. M., 1976. Asterozoa from Amsterdam and St Paul Islands, Southern Indian Ocean. *ibid.*, **30**, 6: 247-261, 6 pls.
- Clark, A. M., 1980a. Echinoderms of Hong Kong, Proc. First Int. Mar. Biol. Vork., 485-501.
- Clark, A. M., 1980b. Some Ophiuroidea from the Seychelles Islands and Inhaca, Mozambique (Echinodermata). Rev. Zool. Afr., **94**, 3: 533-558.
- Clark, A. M. and P. S. Davies, 1966. Echinoderms of the Maldiv Island. Ann. Mag. Nat. Hist. Ser., **13**, 8: 597-612, pl. 18.
- Clark, A. M. and F. W. E. Rowe, 1971. Monograph of Shallow-Water Indowest Pacific Echinoderms. Trustees Brit. Mus. (Nat. Hist.) London, vii + 238, 100 figs., 31 pls.
- Clark, A. M. and J. Courtman-Stock, 1976. The Echinoderms of Southern Africa. Bull. Brit. Mus. (Nat. Hist.) Zool. 108-263.
- Clark, A. M. and J. D. Taylor, 1971. Echinoderms Diego Garca. Atoll. Bes. bull., 149:89-92.
- Clark, H. L., 1908. Some Japanese and East Indian Echinoderms. No. 11, Bull. Mus. Comp. Zool., 279-311.
- Clark, H. L., 1909. Notes on some Australian and Indopacific Echinoderms. Bull. Mus. Comp. Zool., **52**, 7: 109-135.
- Clark, H. L., 1911. North Pacific Ophiurans in the Collection of the United States National Museum. Smith. Inst. Unit. Stat. Nat. Mus. Bull. 75:1-XVI, 1-302.
- Clark, H. L., 1915. Catalogue of Recent Ophiurans: Bases on the Collection of the Museum of Comparative Zoology. Mum. Mus. Com. Zool. Harv. Coll., **25**, 4: 1-375, 20 pls.
- Clark, H. L., 1921. The Echinoderm Fauna of Torres Strait Its Composition and its orgin. Carnegie Inst. Wash., 104-223, 38 pls.
- Clark, H. L., 1939. Ophiuroidea. Scient. Rep. John Murray Exped., **4**: 29-136, 62 Text-figs.
- Clark, H. L., 1946. The Echinoderm fauna of Australia Its Composition and Its Origin. Carnegie Inst. Wash. Pub., 1-567.
- Devaney, D. M., 1974. Shallow-Water Asterozoans of Southeastern Polynesia II. Ophiuroidea. Micronesica, **10**: 105-204.
- Devaney, D. M., 1978. A Review of Genus Ophiomastix (Ophiuroidea: Ophiocomidae). *ibid.*, **14**: 273-359.
- Döderlein L., 1896. Bencht über die van semon bei Amboina und Thursday Islands gesmmelten Ophiuroidea, in Semon's Forschungereisen. 5, Jena. cited from Koehler, R., 1922.
- Döderlein L., 1911. Über Japanische and andere Euryalae. Abh. d. Il. Kl. d. K. Ak. d. Wiss. Il. Suppl. -Bd. 5. Abh: 1-123, pls. 1-9.
- Döderlein L., 1927. Indopacifische Euryalae. Abh. bayer. Akad. Wiss., **31**, 6: 1-105, 10 pls.

- Domantay, J. D. and C. R. Domantay, 1966. Studies on the classification and distribution of Philippine littoral Ophiuroidea (Brittle Stars). *Phil. Jour. Sci.*, **35**, 1: 1-78, 2 pls.
- Domantay, J. S. and C. R. Conlu, 1968. The Echinoderm fauna of Manila Bay, *ibid.*, **97**, 2: 159-176.
- Downey, M. E., 1969. Catalog of Recent Ophiuroid Type Specimens in Major Collections in the United States. *U. S. Nat. Mus. Bul.*, 293: 1-239.
- Duncan, P. M., 1879. On some Ophiuroidea from Korean Seas. *J. Linn. Soc. Zool.*, **14**: 445-482, 3 pls.
- D'yakonov, A. M., 1930. Echiniden, Ophiuriden und Asteriden gesammelt von Prof. R. J. Schmidt bei den Riu-Kiu Inseln im Jahre 1926-1927. *Zool. Jb.*, **59**: 233-252, 2 pls.
- D'yakonov, A. M., 1954. Ophiuroids of the USSR Seas. *Acad. Sci. USSR.*, **55**: 1-136, 47 figs.
- Ely, C. A., 1942. Shallow-Water Asteroidea and Ophiuroidea of Hawaii. *Bernice P. Bishop Mus. Bull.*, **176**: 1-63, 12 pls.
- Engel, H., 1938. Asteries et Ophiures Resultats Scientifiques du Voyage aux Indes Orientales Néerlandaises. *Mem. Rov. D'Hest. Nat. Bely.*, **3**, 18: 1-2.
- Fell, H. B., 1946. The Embryology of the Viviparous Ophiuroid *Amphipholis squamata* Deele Chiaje. *Trans. Roy. Soc. N. Z.*, **75**, 4: 419-464, 20 figs.
- Fell, H. B., 1962. A Revision of the Major Genera of Amphiurid Ophiuroidea. *Trans. R. Soc. N. Z. Zool.*, **2**, 1: 1-26.
- Gibbs, P. E., Clark A. M. and C. M. Clark, 1976. Echinoderms from the Northern Region of the Great Barrier Reef, Australia. *Bull. Br. Mus. (Nat. Hist) Zool.*, **30**, 4: 104-144, 1 pl.
- Irimura, S., 1968. 出邊湾およびその周辺のクモヒトデ類について (豫報). *Nankiseibutu*, **10**, 1 & 2: 30-38.
- Irimura, S., 1969. Supplemental report of Dr. Murakami's paper on the Ophiurans of Amakusa, Kyushu. *Pub. Amakusa Mar. Biol. Lab., Kyushu Univ.*, **2**, 1: 37-48, 4 pls.
- Irimura, S., 1979. Ophiuroidea of Sado Island, the Sea of Japan. *Ann. Rep., Sado Mar. Biol. St.*, **9**: 1-6.
- Irimura, S., 1981. Ophiurans from Tanabe Bay and its vicinity with the description of a new species of *Ophiocentrus*. *Pub. Seto Mar. Biol. Lab.*, **26**, 1-3: 15-48, 9 figs., 1 pl.
- Irimura, S., 1982. The Brittle-stars of Sagami Bay. *Biol. Lab. Imp. Hous., Japan.* xii + 95 pp. 15 pls.
- Ives, J. E., 1891. Echinoderms and Arthropod from Japan. *Proc. Acad. Nat. Sci. Philadelphia*, 1891: 210-223, 6 pls.
- James, D. B. and J. S. Pearse, 1969. Echinoderms from the Gulf of Suez and the Northern Red Sea. *Jour. Mar. Biol. Ass. India.*, **11**, 1-2: 78-125.
- Knudsen, J. and T. Wolff, 1970. Atlantic Report No. 11 Scientific Results of the Danish Expedition to the Coasts of Tropical West Africa 1945-1946. *West African Ophiuroids. Univ. Cop. Brit. Mus. (Nat. Hist). London.* 150-241, 49 figs.
- Koehler, R., 1898. Echinodermes recueillis par "I' Investigator" dans l'océan Indien. II. Les Ophiures Littorales. *Bull. Sci.*, **31**: 51-124, pls. 2-5.
- Koehler, R., 1899. An Account of the Deep-sea Ophiuroidea Collected by the Royal Indian marine Survey Ship "Investigator". *Calcutta Quarto*, 1-76, I, II: pls. 1-14.
- Koehler, R., 1904. Ophiures de mer profonde. *Siboga Exped., Mon.*, **45a**: 1-176, 36 pls.
- Koehler, R., 1905. Ophiures littorales. *Siboga Exped.*, **45b**: 1-422, 18 pls.
- Koehler, R., 1914. A Contribution to the study of Ophiurans of the United States National Museum. *Smith. Inst. Unit. Stat. Nat. Mus., Bull.*, **84**: 1-165, 18 pls.
- Koehler, R., 1922. Ophiurans of the Philippine Seas and Adjacent Waters. *ibid.*, **100**, 5: VIII + 486, 103 pls.
- Kyte, M. A., 1969. A Synopsis and key to the Recent Ophiuroidea of Washington State and Southern British Columbia. *J. Fish. Res. Bd. Canada*, **26**: 1727-1741.
- Liao, Y., 1978. The Echinoderms of the Xisha Islands. Guangdong Province, China. II. Ophiuroidea. *Inst. Oceanogr.*

- Acad. Sinica, **386**: 69-102, 4 pls. (In Chinese).
- Lütken, C. F. and T. Mortensen, 1899. Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands XXV. The Ophiuridae. Mem. Mus. Comp. Zool. Harv., **23**, 2: 97-208, 23 pls.
- Lyman, T., 1865. Ophiuroidea and Astrophytidae. Illust. Cat. Mus. Comp. Zool. Harv., **1**: vi + 200, 2 pls.
- Lyman, T., 1869. No. 10-Preliminary Report on the Ophiuridae and Astrophytidae dredged in deep water between Cuba and the Florida Reef, by L.F. De. Assist. U.S. Coast Survey. Bull. Mus. Comp. Zool. Harv., **1**: 309-354.
- Lyman, T., 1874. No. 10-Ophiuridae and Astrophytidae, Old and New. *ibid.*, **3**: 221-272, 7 pls.
- Lyman, T., 1878. No. 7-Ophiuridae and Astrophytidae of the Exploring Voyage of H.M.S. "Challenger," under Prof. Sir Wyville Thomson, F. R. S. 65-168, 10 pls.
- Lyman, T., 1879. No. 2-Ophiuridae and Astrophytidae of the Exploring Voyage of H. M. S. "Challenger," under Prof. Sir Wyville Thomson, F. R. S. Part II. Bull. Mus. Comp. Zool. Harv., **6**, 2: 17-83, pls. 11-19.
- Lyman, T., 1882. Report on the Ophiuroidea dredged by H. M. S. Challenger during the years 1873-76. *ibid.*, **1**: 1-386, 48 pls.
- Lyman, T., 1883. Report on the Results of Dredging under the Supervision of Alexander Agassiz, in the Caribbean Sea in 1878-79, and along the Atlantic Coast of the United States during the Summer of 1880, by the U. S. Coast Survey Steamer "Blake" Commander J. R. Bartlett, U. S. M., Commanding. XX. Report on the Ophiuroidea. *ibid.*, **10**: 227-287, 8 pls.
- Madsen, F. J., 1970. West African Ophiuroids. Atlantide Report **11**: 151-241.
- Marktanner-Turneretscher, G., 1887. Beschreibung neuer Ophiuriden und Bemerkungen zu Bekanten. Ann. Naturh. Mus. Wien., **2**: 291-316, 2 pls.
- Martens, von E., 1870. Die Ophiuriden des Indischen Ocean, **36**: 244-262.
- Matsumoto, H., 1911. 日本産テヅルモヅル科に就て. Jour. Zool., Japan, **23**, 277: 617-631.
- Matsumoto, H., 1912a. 日本産テヅルモヅル類の再査. *ibid.*, **24**, 282: 198-207.
- Matsumoto, H., 1912c. 日本産テヅルモヅル類. *ibid.*, **24**, 285: 379-390.
- Matsumoto, H., 1915. A New Classification of the Ophiuroidea. With Descriptions of New Genera and Species. Proc. Akad. Nat. Sci. Philadelphia, **67**: 43-92.
- Matsumoto, H., 1917. A monograph of Japanese Ophiuroidea, arranged according to a new classification, Jour. Coll. Sci. Imp. Univ. Tokyo, **38**, 2: 1-408, 52 pls.
- Matsumoto, H., 1941. Report of the Biological Survey of Mutsu Bay 36. Ophiuroidea of the Mutsu Bay and Vicinities. Sci. Rep. Tohoku Imp. Univ. Ser. 4. Biol., **16**, 3: 331-344, 3 pls.
- Matsumoto, H., 1918. On a collection of Ophiurans from the vicinity of Kinkwasan, with description of a new species. Annot. Zool. Japan, **4**, 4: 475-480.
- May, R.M., 1924. The Ophiurans of Monterey Bay. Proc. Cal. Acad. Sci. Fourth Ser., **13**, 18: 261-303, 17 text-figs.
- McClendon, J. F., 1909. Contributions from the Laboratory Marine Biological Association of San Diego XXV. The Ophiurans of the San Diego Region. Univ. Cal. Pub. Zool., **6**, 3, 33-64, 6 pls.
- Mortensen, T., 1920. On Hermaphroditism in Viviparous Ophiurids. Acta Zoologica. 1-18, 1 pl.
- Mortensen, T., 1924. Papers from Dr. Th. Mortensen's Pacific Expedition 1914-16. XX. Echinoderms of New Zealand and the Auckland-Compbell Islands. II. Ophiuroidea. Vidensk. Medd. Fra Dansk naturh. Foren., **77**: 91-177, pls. 3-4.
- Mortensen, T., 1927. Echinoderms of the British Isles. III Class Brittle-stars or Ophiuroids. (Ophiuroidea). 145-254.
- Mortensen, T., 1933a. Studies of Indo-Pacific Euryalids. Vid. Med. Naturh. For. Kbh., **96**: 1-75, 5 pls.
- Mortensen, T., 1933b. Ophiuroidea. Dan. Ingolf-Exped. **4**, 8: 1-121, 3 pls.

- Mortensen, T., 1933c. Papers from Dr. Th. Mortensen's Pacific Expedition 1914-16. LXVI. The Echinoderms of St. Helena. (Other than Crinoids). Vidensk. Medd. Fra Dansk naturh. Foren. 401-465.
- Mortensen, T., 1936. Echinoidea and Ophiuroidea. Dis. Rep., 12: 199-348, 9 pls.
- Mortensen, T., 1940. Echinoderms from the Iranian Gulf. Dan. Scient. Invest. Iran. Part. 2: 55-112, 2 pls.
- Mortensen, T., 1952. Reports of the Land University Chile Expedition 1948-49. Acta Univ. Lund N. E. 2, 47, 8: 1-22, 3 figs., 1 pl.
- Müller, J et F. H. Troschel, 1842. System der Asteriden Braunschweig, XX + 134, 12 pls.
- Murakami, S., 1842. Ophiurans of Izu, Japan. Dept. Agric. Kyusyu Imp. Univ., 7, 1: 1-36.
- Murakami, S., 1943a. Report of the Ophiurans of Palao, Caroline Islands. *ibid.*, 7, 4: 159-204.
- Murakami, S., 1943b. Report on the Ophiurans of Yaeyama, Ryukyu. *ibid.*, 7, 5: 205-222.
- Murakami, S., 1943c. Ophiurans from some Gulfs and Bays of Nippon, *ibid.*, 7, 6: 223-234.
- Murakami, S., 1944a. Report on the Ophiurans from off Ogasawara Islands and from off the Yaeyama group, Nippon. *ibid.* 7, 7: 235-257, 1 pl.
- Murakami, S., 1944b. Note on the Ophiurans of Amakusa, Kyusyu. *ibid.*, 7, 8: 259-279.
- Murakami, S., 1963a. On some Ophiurans from Kii and Vicinities with description of a new species. Seto Mar. Biol. Lab., 11, 2: 171-184.
- Murakami, S., 1963b. The Dental and Oral plates of Ophiuroidea. Trans. Royal Soc. New Zealand Zool., 4, 1: 1-48, 7 pls.
- Parslow, R. E. and A. M. Clark, 1963. Ophiuroidea of the Lesser Antilles Studies on the Fauna of Cura cao and other Caribbean Islands., 15: 24-50.
- Pawson, D. L., 1978. The Echinoderm fauna of Ascension Island, South Atlantic Ocean. Smith. Cont. Mar. Sci., 2: iv + 31.
- Rho, B. J., 1979. A Study on the Classification and the Distribution of the Echinoderms in Korea 1. Ophiuroids. Jour. Kor. Res. Inst. Bet. Liv., 23: 33-50.
- Rho, B. J. and H. S. Kim, 1966. Studies on the Echinodermata (Echinoidea, Asteroidea and Ophiuroidea) from Korea. Collect. Thes. Writ. Commen. Dr. Emma Kim's Forty years Teac. Ewha Womans Univ., Seoul, Korea., 273-293, 9 pls.
- Rho, B. J. and S. Shin, 1983. A Systematic Study on the Ophiuroidea in Korea 2. Phrynophiurida. Jour. Kor. Res. Inst. Bet. Liv., 31: 57-64, 4 pls.
- Shin, S. and B. J. Rho, 1986. *Ophiacantha linea*, a New Brittlestar Species from Cheju Island, Korea (Echinodermata, Ophiuroidea). Kor. Jour. Syst. Zool., 2, 2: 59-66.
- Sloan, N. A., A. M. Clark and J. D. Taylor, 1979. The Echinoderms of Aldabra and their habits. Bull. Br. Mus. Nat. Hist. (zool.), 37, 2: 81-128, 22 figs.
- Verrill, A. E., 1869. On new and imperfectly known Echinoderms and Corals. Proc. Boston Soc. Nat. Hist., 12: 381-391. cited from Liao, Y., 1978.
- Verrill, A. E., 1899. North American Ophiuroidea. I Revision of certain families and genera of West Indian Ophiurans. 2 A faunal catalogue of the known species of West Indian Ophiurans. Trans. Conn. Acad. Arts Sci., 10: 301-386, pls. 42-43.
- Yi, S. K., 1983. Studies on the Ophiuroidea in the coastal Waters of Korea 1. Amphiuroidae. Bulletin of KORDI, 5: 9-17.

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Explanation of Plates

PLATE 1

- Figs. 1-5.** *Gorgonacephalus dolichodactylus* Döderlein, 1911.
1. Dorsal view, scale size 1cm.
2. Ventral view, scale size 1cm.
3-5. Arm spines, scale size 50 μ m.
- Figs. 6-9.** *Astrocladus ludwigi* (Döderlein, 1896).
6,9. Arm spines, scale size 50 μ m.
7. Dorsal view, scale size 1cm.
8. Ventral view, scale size 1cm.
- Figs. 10-14.** *Astroboa arctos* Matsumoto, 1915.
10, 11, 14. Arm spines, scale size 50 μ m.
12. Dorsal view, scale size 1cm.
13. Ventral view, scale size 1cm.

PLATE 2

- Figs. 1-5.** *Amphipholis squamata* (Delle Chiaje, 1829).
1, 3. Dorsal view, scale size 1mm.
2, 4. Ventral view, scale size 1mm.
5. Arm spines, scale size 1mm.
- Figs. 6-11.** *Amphipholis pugetana* Lyman, 1861.
8, 10. Dorsal view, scale size 1mm.
7, 9, 11. Ventral view, scale size 1mm.
6. Lateral arm paltes and arm spines, scale size 1mm.

PLATE 1

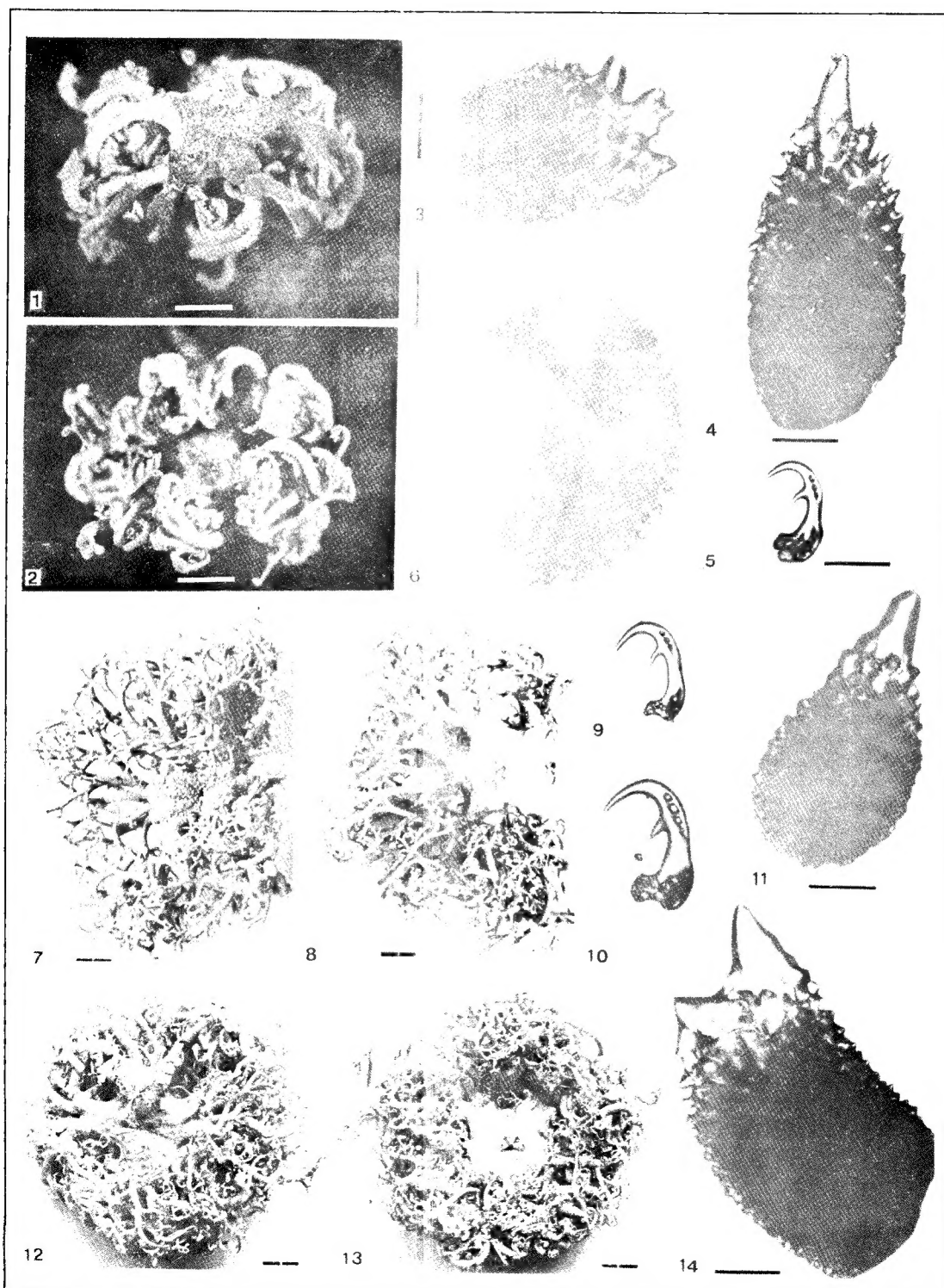


PLATE 2

